

What is claimed is:

1. A composition for removing residues from the microstructure of an object comprising:
carbon dioxide;
an additive for removing the residues comprising a fluoride having a formula $\text{NR}_1\text{R}_2\text{R}_3\text{R}_4\text{F}$, where R_1 , R_2 , R_3 , and R_4 are each independently a hydrogen or an alkyl group; and
a co-solvent for dissolving said additive in said CO_2 at a pressurized fluid condition.
2. The composition of claim 1 wherein the additive further comprises a basic compound.
3. The composition of claim 1 wherein R_1 , R_2 , R_3 , and R_4 are hydrogen.
4. The composition of claim 1 wherein R_1 , R_2 , R_3 , and R_4 are an alkyl group.
5. A composition for removing residues from the microstructure of an object comprising:
carbon dioxide,
a compound having a hydroxyl group,
a fluoride having a formula $\text{NR}_1\text{R}_2\text{R}_3\text{R}_4\text{F}$, where R_1 , R_2 , R_3 , and R_4 are each independently a hydrogen or an alkyl group.
6. The composition of claim 5 further comprising a basic compound.
7. The composition of claim 6 wherein the basic compound is selected from a quaternaryammoniumhydroxide, an alkylamine, an alkanolamine, a hydroxylamine, and mixtures thereof.
8. The composition of claim 5 further comprising a co-solvent selected from dimethylacetamide, propylene glycol, dimethylsulfoxide, deionized water, acetic acid, and mixtures thereof.

9. The composition of claim 8 wherein the co-solvent comprises deionized water.
10. The composition of claim 8 wherein the co-solvent is substantially free of water.
11. The composition of claim 5 wherein R_1 , R_2 , R_3 , and R_4 are hydrogen.
12. The composition of claim 5 wherein R_1 , R_2 , R_3 , and R_4 , are an alkyl group.
13. The composition of claim 5 wherein the fluoride is selected from ammonium fluoride, tetramethylammoniumfluoride, tetraethylammoniumfluoride, tetrabutylammoniumfluoride, tetrapropylammoniumfluoride, choline fluoride, and mixtures thereof.
14. The composition of claim 5 wherein the compound is selected from ethanol, methanol, n-propanol, isopropanol, n-butanol, iso-butanol, diethyleneglycolmonomethylether, diethyleneglycolmonoethylether, hexafluoroisopropanol, and mixtures thereof.
15. A composition for removing residues from the microstructure of an object comprising:
carbon dioxide wherein the carbon dioxide is in a pressurized or a supercritical fluid state;
an additive selected from a basic compound, a fluoride having a formula $NR_1R_2R_3R_4F$, where R_1 , R_2 , R_3 , and R_4 are each independently a hydrogen or an alkyl group, and mixtures thereof;
a cosolvent selected from an alcohol, dimethylacetamide, propylene glycol, dimethylsulfoxide, deionized water, acetic acid, and mixtures thereof.
16. The composition of claim 15 wherein the additive is dissolved within the cosolvent.
17. A composition for removing residues from the microstructure of an object comprising:

from 0.001 to 8 weight percent of an additive selected from a basic compound, a fluoride having a formula $\text{NR}_1\text{R}_2\text{R}_3\text{R}_4\text{F}$, where R_1 , R_2 , R_3 , and R_4 are each independently a hydrogen or an alkyl group, and mixtures thereof;

from 1 to 50 weight percent of a cosolvent selected from an alcohol, dimethylacetamide, propylene glycol, dimethylsulfoxide, deionized water, acetic acid, and mixtures thereof; and

carbon dioxide.

18. The composition of claim 17 wherein the residues are at least one selected from photoresist, UV-hardened resist, X-ray hardened resist, ashed resists, carbon-fluorine containing polymer, plasma etch residues, organic process contaminants, and inorganic process contaminants.